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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,552	07/25/2007	Tsuyoshi Moriyama	359636-000003	4740

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EXAMINER	
ANDREWS, MICHAEL	
ART UNIT	PAPER NUMBER
2834	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/582,552	MORIYAMA ET AL.	
	Examiner	Art Unit	
	MICHAEL ANDREWS	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 March 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-53* is/are pending in the application.

4a) Of the above claim(s) *28 and 37-52* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27,29-36 and 53* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is responsive to the Applicant's communication filed March 29, 2011. In virtue of this communication and the amendment concurrently filed, claims 27-53 are pending in the application, with claims 28 and 37-52 being withdrawn from consideration.

Response to Arguments

1. Applicant's arguments filed March 29, 2011 have been fully considered but they are not persuasive.

The argument states that the prior art references, particularly Chitayat which was applied to teach the "non-magnetic and conductive" reinforcing member, do not disclose an electrically conductive reinforcing member. While it is true that Chitayat does not disclose the reinforcing member being made of "non-magnetic and conductive material", Chitayat does disclose that aluminum and ceramics are both useful as heat-sinks (col. 7, lines 51-67). Since the ceramic material of Chitayat's reinforcing member is used for its heat dissipating properties (col. 8, lines 18-37), it would have been obvious to one of ordinary skill in the art to replace one such material with another.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which

said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 27, 29-35, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Izawa et al. (US 6,075,297), hereinafter referred to as "Izawa", in view of Chitayat (US 5,783,877), Munehiro (US 4,445,798), and Umehara et al. (US 5,057,723), hereinafter referred to as "Umehara".

With regard to claim 27, Izawa discloses a coreless linear motor [LDM2, LDM4] (see figures 6A-6B and 9A-9B) comprising:

a fixed member [1400] functioning as a stator (see col. 9, lines 60-67); and

a movable member [20] functioning as an armature (see col. 9, lines 64-67);

the fixed member having a yoke [141] and first and second groups of permanent magnets [142] fixed to the yoke (see col. 10, lines 4-9);

the movable member [20] having a coil assembly [2] (see col. 9, lines 63-65) having an inner shape of a rectangle (figure 6B) and a reinforcing member [24] having

an outer shape of a rectangle on which the coil assembly [2] is fittingly mounted (figure 6B; col. 5, lines 17-33), the reinforcing member [24] extending in a longitudinal direction of the linear motor [LDM2, LDM4] (figure 6A);

the yoke [141] having first and second facing yoke parts facing each other across a first distance and formed by magnetic material and a connection yoke part connecting first ends of the first and second facing yoke parts (the U-shaped yoke with facing parts and a connection part is clearly shown in figures 9A-9B; also see col. 10, lines 4-16) to define a space through which the movable member [20] is movable (figure 6A);

the first and second groups of permanent magnets [142] being arranged so as to face the facing surfaces of the first and second facing yoke parts (there are magnets on both the right and left sides in the figure), each of the first and second groups of permanent magnets having different magnetic poles alternately arranged (figure 9A), along the longitudinal direction of the yoke being the same (The polarization of magnets on opposite sides matches, as shown in figure 9A.);

the coil assembly [2] having at least three coils (see col. 5, lines 29-33; LDM4 has the same structure, besides the permanent magnets, as LDM1 and LDM2; see col. 8, lines 24-25 and col. 9, lines 60-62), continuously arranged (figure 9A; the coils are arranged directly adjacent to one another in the axial direction), functioning as three phase coils (col. 5, lines 29-33), having hollow and rectangular or square outer shape (figure 9B, the cross-section of the coils are square-shaped and the coils are hollow and wound around a support structure), the reinforcing member [24] being fitted into the hollow shape (figure 9B), and arranged movably relative to the first and second groups

of permanent magnets along the longitudinal direction of the yoke (see col. 9, lines 65-67);

each coil being wound in a cylindrical form (figure 9B) by a conductive metal wire (col. 5, lines 17-19);

the at least three coils being arranged and wound solidly in multiple layers (multiple layers of the coils are clearly visible in figure 9B), the end surfaces of adjacent coils connected with each other via an electrical insulation member [21] (see col. 5, lines 19-25; bobbins are well-known to be made of non-magnetically conductive material);

the coil assembly [2] and reinforcing member [24] moving in the space between said facing first and second groups of permanent magnets along the longitudinal directions of the yoke (see col. 5, lines 12-16 and figure 9A).

Izawa does not expressly disclose that the coil is fastened by a binder, or that the reinforcing member being made of a non-magnetic and electrically conductive material.

Chitayat discloses a coreless linear motor (see col. 1, lines 5-9 and figure 3A) having a movable member [30] with coils [36] (see col. 5, lines 16-34), wherein the coils are fastened by a binder [38] (see col. 5, lines 23-25). Chitayat also discloses a coreless linear motor wherein said movable member [30] further has a nonmagnetic and conductive reinforcing member [70, 71, 72] fit in solid parts of said coils [36] (see col. 8, lines 18-23 and figures 6a-6c; col. 8, lines 27-34; the reinforcing member is designed for "minimizing the thermal junction resistance", minimizing thermal resistance is equivalent to increasing the thermal conductivity), and the nonmagnetic and conductive reinforcing

member [70-72] being fitted into the hollow shape (figures 6a-6c) and moving in the space between said permanent magnets [31a/b] (col. 5, lines 17-24).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the linear motor of Izawa by fastening the coils with a binder as taught by Chitayat, for securing the coils thereof, since Chitayat teaches that setting the coils in resin aids in cooling the coils (see col. 5, lines 30-34); and adding a non-magnetic and conductive reinforcing member to the moving part, for supporting the coils thereof.

While Chitayat does not expressly disclose that the reinforcing member [70, 71, 72] is made of a non-magnetic and electrically conductive material, one of ordinary skill in the art would have known that aluminum (a non-magnetic and electrically conductive material) is well known for its low thermal resistance and light weight (see col. 7, lines 36-38 of Chitayat), desirable in rotating machines. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use aluminum for the reinforcing member, for improving its thermal conductivity, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

The combination of Izawa and Chitayat still does not expressly disclose the first, second, and connection yokes being formed by magnetic material.

Munehiro discloses a linear motor (figures 1-3) wherein the first, second, and connection yokes [2-4] are formed from magnetic material (col. 2, lines 26-40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the yokes of Izawa by forming them from magnetic material as taught by Munehiro, for generating additional magnetic flux, thus increasing the output driving force of the linear motor (col. 3, lines 34-46).

The combination of Izawa, Chitayat, and Munehiro still does not explicitly disclose the coil assembly [2] being wound in a same direction.

Umehara discloses a linear motor [1] (figure 6) having a movable member [5] with coils [7] being wound in a same direction (figure 6; col. 4, lines 15-49).

It would have been obvious to one of ordinary skill in the art when the invention was made to implement the coils of Izawa by winding them in the same direction as taught by Umehara, for reducing the size and weight of the motor, since Umehara teaches that winding the coils in the same direction increases the stroke of the motor and allows for the use of thin-walled and lightweight yoke members (col. 4, lines 34-49).

With regard to claim 29, the combination of Izawa, Chitayat, Munehiro, and Umehara discloses a coreless linear motor as set forth in claim 27, as stated above, wherein in the cross-sectional shape of the reinforcing member, a length of a side facing the first and second groups of permanent magnets is longer than a length of a side perpendicular to the first and second groups of permanent magnets (see figure 6b; the top surface of the member [70, 71, 72] is clearly longer than its vertical, perpendicular to the magnets, dimension).

With regard to claim 30, the combination of Izawa, Chitayat, Munehiro, and Umehara discloses a coreless linear motor as set forth in claim 29, as stated above, wherein a hole [52a/b, 54a/b] through which a cooling agent passes is formed (see col. 7, lines 9-24 and figure 5 of Chitayat). The combination does not expressly disclose the hole being formed inside the reinforcing member. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the coolant passage in the reinforcement member instead, for the purpose of moving the passage closer to the coils and improving cooling performance (see col. 4, lines 56-67), since it has been held that merely rearranging the essential working parts of a device would be an obvious matter of design choice. In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

With regard to claim 31, the combination of Izawa, Chitayat, Munehiro, and Umehara discloses a coreless linear motor as set forth in claim 30, as stated above, wherein heat radiating fins [60a/b] are formed (see col. 8, lines 1-17 and figure 5). The combination does not expressly disclose the fins being formed in a hole inside the reinforcing member. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the fins inside the hole instead, for the purpose of increasing the heat exchanged to the coolant, since it has been held that merely rearranging the essential working parts of a device would be an obvious matter of design choice. In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

With regard to claim 32, the combination of Izawa, Chitayat, Munehiro, and Umehara discloses a coreless linear motor as set forth in claim 29, as stated above, except that the combination does not expressly disclose that the reinforcing member [70, 71, 72] is produced by aluminum or an aluminum alloy. However, one of ordinary skill in the art would have known that aluminum is well known for its low thermal resistance and light weight (see col. 7, lines 36-38 of Chitayat), desirable in rotating machines. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use aluminum for the reinforcing member since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With regard to claim 33, the combination of Izawa, Chitayat, Munehiro, and Umehara discloses a coreless linear motor as set forth in claim 29, as stated above, wherein the movable member [30] is further provided with a holding member [52] and spacers [74] (see col. 8, lines 27-36 and figures 5-6a of Chitayat), and

the two ends of the reinforcing member [70, 71, 72] inserted into the coil assembly [36] are held by the holding member via the spacers (see col. 8, lines 18-23 and figures 5-6a of Chitayat).

With regard to claim 34, the combination of Izawa, Chitayat, Munehiro, and Umehara discloses a coreless linear motor as set forth in claim 33, as stated above,

wherein the reinforcing member [70, 71, 72] and the spacers [74] are formed by materials having a heat conductivity (see col. 8, lines 31-41).

With regard to claim 35, the combination of Izawa, Chitayat, Munehiro, and Umehara discloses a coreless linear motor as set forth in claim 34, as stated above, except that the combination does not expressly disclose that the reinforcing member [70, 71, 72] and the spacers [74] are formed by aluminum or an aluminum alloy. However, one of ordinary skill in the art would have known that aluminum is well known for its low thermal resistance and light weight (see col. 7, lines 36-38 of Chitayat), desirable in rotating machines. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use aluminum for the reinforcing member and spacers since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With regard to claim 53, the combination of Izawa, Chitayat, Munehiro, and Umehara discloses a coreless linear motor as set forth in claim 27, wherein the at least three coils (see col. 5, lines 29-33; LDM4 has the same structure, besides the permanent magnets, as LDM1 and LDM2; see col. 8, lines 24-25 and col. 9, lines 60-62) have rectangular cross-sections (figure 9B, the cross-section of the coils are square-shaped).

5. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Izawa, Chitayat, Munehiro, and Umehara as applied to claim 29 above, and further in view of Inagaki et al. (US 2003/0173836 A1), hereinafter referred to as "Inagaki".

With regard to claim 36, the combination of Izawa, Chitayat, and Munehiro discloses a coreless linear motor as set forth in claim 29, as stated above, wherein the reinforcing member [70, 71, 72] is arranged spaced from the surfaces of the first and second groups of permanent magnets [31a/b] by a certain distance (see figure 5 of Chitayat). The combination does not disclose spacing the reinforcing member form the surfaces of the permanent magnets by a distance whereby the density of the magnetic flux incident upon the surface of the reinforcing member is half or less of the magnetic flux density at the surface of the magnets.

Inagaki discloses that varying the gaps between magnetic components of linear motors affects the magnetic flux incident on the components (see [0008], lines 1-6 of Inagaki). It would have been obvious to one of ordinary skill in the art at the time the invention was made to disclose similar values, for the purpose of increasing motor efficiency (see [0008], lines 6-13 of Inagaki), since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Inquiry

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Andrews whose telephone number is (571)270-7554. The examiner can normally be reached on Monday through Thursday between the hours of 7:30 and 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen Leung can be reached at (571)272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quyen Leung/
Supervisory Patent Examiner, Art Unit 2834

/M. A./
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